

REQUEST FOR RECONSIDERATION

Claims 1-6 and 8-12 are pending in this application. Claim 1 is independent.

Applicants thank the Examiner for the indication in the Office Action at page 4, section 6, that Claims 2-3 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. However, for the reasons given below, Applicants respectfully submit that all of the pending claims are allowable.

The present invention is based on the findings that small amounts of acetic acid or propionic acid which are usually present in acrylic acid are responsible for the malodorous properties of superabsorbent polymers derived from acrylic acid. However, the unpleasant odor can only be noticed and thus is particularly acute when the superabsorbent polymer has been subjected to a post-surface crosslinking step. See specification at page 2, lines 25-31.

Claims 1, 4-6 and 8-12 are rejected under 35 U.S.C. § 102(e) over U.S. Patent No. 6,388,000 ("Irie"). Irie discloses a method for the production of a hydrophilic resin which comprises using a water-soluble unsaturated monomer having a  $\beta$ -hydroxy propionic acid (salt) content of not more than 1,000 ppm. Irie at Abstract.

The Office Action at page 4, line 1, admits that "Irie et al. are silent on acetic acid, propionic acid, or combinations thereof as impurities".

However, the Office Action at page 4, lines 2-3, asserts that Irie's silence on acetic acid and propionic acid "implies that the amount of acetic acid, propionic acid, or combinations thereof as impurities is 0 ppm".

Applicants respectfully traverse this assertion because technical grade acrylic acid always contains noticeable amounts of impurities such as acetic acid and propionic acid in amounts of at least 0.2 % by weight. See specification at page 10, lines 15 ff. and the specification sheet entitled "Raw Material Purchase Specifications and Requirements" of attached Declaration Under 37 C.F.R. § 1.132. From the specification sheet the quality

specification of technical grade acrylic acid used for superabsorbent production can be taken. It has to be noted that this specification sheet relates to "low dimer" glacial acrylic acid, i.e., to a high quality, purified acrylic acid. From the specification sheet, it is clear that the prior art regards about 1300 ppm acetic acid plus propionic acid to be acceptable for the purpose of superabsorbent polymer production.

This is also confirmed by the Rule 132 Declaration of Dr. Funk. In his declaration, Dr. Funk states that a typical grade of acrylic acid used in superabsorbent production will contain acetic acid and propionic acid in a total amount ranging from 800 to 1100 ppm (see page 4 of the declaration). Furthermore, Dr. Funk confirms that acrylic acid is a bulk chemical which is only purified to a degree which is absolutely necessary for the intended purposed. Moreover, Dr. Funk states that standard distillation of crude acrylic acid (as taught by Irie) is not a suitable measure for reducing the total concentration of propionic acid and acetic acid to less than 400 ppm. This is also confirmed by comparative example 3 of the present application where the purification of acrylic acid by distillation has been described, which leads to an acrylic acid containing 1200 ppm of acetic acid and 300 ppm of propionic acid.

Irie fails to disclose or suggest the independent Claim 1 limitation of "a process for preparing a low-odor hydrogel-forming acrylic acid polymer, which comprises the steps of: a) preparing a polymeric hydrogel by free-radically polymerizing a monomer composition comprising at least 50% by weight of acrylic acid containing volatile **saturated carboxylic acids selected from the group consisting of acetic acid, propionic acid and combinations thereof as impurities in a total amount of less than 400 ppm**, by weight, based on the amount of acrylic acid . . . ; and b) treating said particulate hydrogel or said hydrogel-forming powder with a crosslinking substance".

There is no reasonable expectation that Irie would have led the skilled artisan to the claimed invention. As discussed above, acrylic acid is a bulk chemical. Bulk chemicals are only purified with regards to those impurities which are known to deteriorate the intended use of the bulk chemical. Consequently a skilled person would purify acrylic acid being intended for the production of hydrogel-forming polymers only from those impurities which are known to interfere with the formation of the properties of the superabsorbent. Since before the present inventors no one had identified acetic acid and propionic acid as being problematic in the production of post-surface crosslinked superabsorbent polymers, the skilled artisan would not be motivated to reduce these impurities. Rather, the skilled artisan would have been prevented from doing so, because of the increased cost associated with the additional purification measures. Thus, there is no reasonable expectation that the cited prior art would have led the skilled artisan to the invention of independent Claim 1.

Any *prima facie* case of obviousness based on the cited prior art is rebutted by the significant reduction in bad odor in polymers derived from acrylic acid that is achieved by the present invention by limiting the total amount of impurities of acetic acid and propionic acid in the acrylic acid to less than 400 ppm. The working examples in the specification show that the total concentration of acetic acid and propionic acid must be low in order to obtain a post surface crosslinked superabsorbent polymer that has good odor properties (see specification examples on page 23). Moreover, comparative Example 3 reveals that an acrylic acid which was purified by distillation, and thus contains only small amounts of  $\beta$ -hydroxy propionic acid, does not lead to a hydrogel-forming polymer having good odor properties, since the total concentration of acetic acid and propionic acid is still high.

The cited prior art fails to suggest that bad odor from polymer produced from acrylic acid can be reduced by limiting the total amount of acetic acid and propionic acid impurities in the acrylic acid to less than 400 ppm. Irie is concerned with the problem of residual

monomers, which themselves may be a problem. Irie does not address the problem of bad odor when primarily formed granules of the superabsorbent polymers are subjected to a post surface crosslinking. Irie only focuses on the concentration of  $\beta$ -hydroxy propionic acid and does not recognize that the concentration of acetic acid and propionic acid plays an important role with regard to the odor properties of the post-surface crosslinked polymers.

Because the cited prior art fails to suggest the significant reduction in bad odor in polymers derived from acrylic acid that is achieved by the present invention by limiting the total amount of impurities of acetic acid and propionic acid in the acrylic acid to less than 400 ppm, any *prima facie* case of obviousness based on the cited prior art is rebutted.

Because the cited prior art fails to disclose or suggest all the limitations of independent Claim 1; there is no reasonable expectation of success; and any *prima facie* case of obviousness is rebutted, the prior art rejections should be withdrawn.

In view of the foregoing amendments and remarks, Applicants respectfully submit that the application is in condition for allowance. Applicants respectfully request favorable consideration and prompt allowance of the application.

Should the Examiner believe that anything further is necessary in order to place the application in even better condition for allowance, the Examiner is invited to contact Applicants' undersigned attorney at the telephone number listed below.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,  
MAIER & NEUSTADT, P.C.  
Norman F. Oblon



Corwin P. Umbach, Ph.D.  
Registration No. 40,211

Attached:

Declaration Under 37 C.F.R. § 1.132

Customer Number

**22850**

Tel: (703) 413-3000  
Fax: (703) 413 -2220  
(OSMMN 03/06)